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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Application Number: 10/646,226
Filing Date: August 22, 2003
Appellant(s): OKAE ET AL.

Thomas Basso
For Appellant

EXAMINER'S ANSWER

This is in response to the appeal brief filed April 21, 2011 appealing from the Office action mailed November 12, 2010.

(1) Real Party in Interest

The examiner has no comment on the statement, or lack of statement, identifying by name the real party in interest in the brief.

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

(3) Status of Claims

The following is a list of claims that are rejected and pending in the application:

Claims 6, 7, 9, 10, 12-14, 16, 17, 19, 20, 22, and 23 are pending.

(4) Status of Amendments After Final

The examiner has no comment on the appellant's statement of the status of amendments after final rejection contained in the brief.

(5) Summary of Claimed Subject Matter

The examiner has no comment on the summary of claimed subject matter contained in the brief.

(6) Grounds of Rejection to be Reviewed on Appeal

The examiner has no comment on the appellant's statement of the grounds of rejection to be reviewed on appeal. Every ground of rejection set forth in the Office action from which the appeal is taken (as modified by any advisory actions) is being maintained by the examiner except for the grounds of rejection (if any) listed under the subheading "WITHDRAWN REJECTIONS." New grounds of rejection (if any) are provided under the subheading "NEW GROUNDS OF REJECTION."

(7) Claims Appendix

The examiner has no comment on the copy of the appealed claims contained in the Appendix to the appellant's brief.

(8) Evidence Relied Upon

JP 2002-075368	Yamaura	3-2002
US 6,258,483	Abe	7-2001
US 6,824,924	Kurose et al.	11-2004
US 2002/0192137	Chaloner-Gill et al.	12-2002
US 6,391,493	Goodenough et al.	5-2002

(9) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 6, 7, 9, 12, 13, 16, 17, 19, 20, 22 and 23 are rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaura (JP 2002-075368) in view of Abe (US 6,258,483) and Kurose et al. (WO00/02280, with US 6,824,924 used as an English translation, since it is the 371 of the foreign application) and as evidenced by Chaloner-Gill et al. (US 2002/0192137).

Yamaura teaches a positive electrode active material for a nonaqueous electrolyte cell wherein the particles of active material are of the formula $LiNi_{1-x}M_xO_2$ wherein M is one of Al, Co, and B, and the surfaces of the particles are covered by particles of the general formula $LiFePO_4$ (abstract, [0001]).

Yamaura teaches coating of the $LiNi_{1-x}M_xO_2$ particles with the $LiFePO_4$ particles by mixing in a hybridization system, adjusting the rotational speed to produce the desired product ([0054], [0055]). Since this same method is disclosed in the instant specification (page 11 lines 18-26), the skilled artisan would find that the resulting product would be the same.

In paragraph [0037] of the instant disclosure, applicants name $LiFePO_4$ as a preferable positive active material but fail to state explicitly that $LiFePO_4$ is of the olivine structure.

Chaloner-Gill teaches that crystalline lithium iron phosphate has an olivine structure ([0126]).

Yamaura fail to teach the claimed weight percent of $LiFeO_4$ to lithium nickelate substrate.

Abe teaches a battery having a positive active material having one material coated on another (column 6 lines 2-5). Abe further teaches that the right amount of coating should be determined, since if there is too much or too little the active material will not have the desired properties of both materials (column 13 lines 38-48).

One of ordinary skill in the art could have applied the improvement of Abe of determining the best ratio coating to base particle to the ratio of nickelate to $LiFeO_4$ in Yamaura and the results would have been predictable.

Regarding claims 7, 17, 20 and 23, the $LiNi_{1-x}M_xO_2$ particles are 11.458 μm on average and the $LiFePO_4$ particles are 0.185 μm on average ([0054]).

With further regard to claims 6, 12, 16, 19, 22 and 23, Yamaura fail to teach the claimed weight percent of $LiFeO_4$ to lithium nickelate substrate.

Abe teaches a battery having a positive active material having one material coated on another (column 6 lines 2-5). Abe further teaches that the right amount of coating should be determined, since if there is too much or too little the active material will not have the desired properties of both materials (column 13 lines 38-48).

Further, when the desired ratio of $LiFePO_4$ particles to nickelate is determined as discussed above, the claimed coating thickness would result since the thickness is determined by the amount of coating material.

One of ordinary skill in the art could have applied the improvement of Abe of determining the best ratio coating to base particle to the ratio of nickelate to $LiFeO_4$ in Yamaura and the results would have been predictable.

Yamaura fails to teach the lithium nickelate compound of instant claims 6, 9, 12, 13, 16, 19, 22 and 23.

Kurose et al. teach $LiNiO_2$ as a positive electrode active material (column 2 lines 56-58). Kurose et al. further teach that the use of $LiNiO_2$ as a positive electrode active material leads to a reduction in size and weight in the battery, increasing energy density.

It would be desirable to use $LiNiO_2$ as a positive electrode active material in the battery of Yamaura such as taught by Kurose et al. since it would lead to a reduction in size and weight in the battery, increasing energy density.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to look to the teachings of Kurose et al. suggesting the use of $LiNiO_2$ as a positive electrode active material in the battery of Yamaura, since such a substitution of $LiNiO_2$ for the lithium nickel oxide of Yamaura would result in the reduction of size and weight of the battery, leading to an increase in energy density.

* * * * *

Claims 10 and 14 rejected under 35 U.S.C. 103(a) as being unpatentable over Yamaura et al. in view of Abe et al. and Kurose et al. and as evidenced by Chaloner-Gill et al., as applied to claims 6 and 12 above, and further in view of Goodenough et al. (US 6,391,493).

Yamaura et al. in view of Abe et al. and Kurose et al. fail to teach that the olivine compound of the positive active material is $LiMnPO_4$.

Goodenough et al. teach that that a preferred olivine electrode compound is $LiMnPO_4$ (column 2 lines 22-24), since it has a larger free volume for lithium-ion motion, which leads to higher lithium-ion conductivity and higher power density, as well as making an inexpensive and nonpolluting battery (column 1 lines 51-57).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to look to the teachings of Goodenough et al. suggesting the use of $LiMnPO_4$ as a positive electrode active material in the battery of Yamaura in view of Kurose et al., since such a substitution of $LiMnPO_4$ for the $LiFePO_4$ of Yamaura is obvious over the teachings of Goodenough et al.

(10) Response to Argument

Appellant's arguments will be addressed in the order in which they appear in the Appeal Brief. Appellant has put forth two basic arguments:

1. that Yamaura does not teach the claimed limitation of a uniform coating of the particles of lithium nickelate with the olivine compound (see pages 18-19), and
2. that the combination of Yamaura with Abe does make obvious the limitation to the relative weight percentages of the lithium nickelate and the olivine compound (see pages 19-21).

With regard to Appellant's arguments concerning the Yamaura reference, the examiner is not convinced. The examiner finds that Yamaura teaches a uniform $LiFePO_4$ coating on lithium nickelate particles.

Appellant is directed to the translation of Yamaura included with this Examiner's Answer. At paragraph [0026], it is taught that the $LiFePO_4$ coating is applied to the lithium nickelate particles in order to protect the surfaces of the lithium nickelate particles from destruction by the non-aqueous electrolyte solution inside the battery. The skilled artisan will recognize that, in order for the $LiFePO_4$ coating to protect the lithium nickelate particles, it is necessary for the $LiFePO_4$ coating to uniformly cover the particles.

Additionally, Appellant is directed to paragraph [0045] of Yamaura, where it is taught that the compound particles (formed by the method described in [0037]-[0043]) are mixed with a binder to form the positive electrode. The skilled artisan will recognize that, when the active material particles are mixed with the binder, it would be impossible to ensure that only the parts of the particles that have the protective $LiFePO_4$ coating are exposed to the non-aqueous electrolyte unless the entire surface of the particles was covered by the $LiFePO_4$ coating.

As for Appellant's arguments concerning the combination of Yamaura in view of Abe, the examiner is not convinced.

First, Appellant states that Abe refers to an alkaline secondary battery, which the examiner notes is a different battery chemistry than that of Yamaura. Yet, Abe is relied

upon in the rejection for the teaching that it was known in the art at the time of the invention to optimize the amount of coating in a coated positive active material compound particle. The examiner finds that it would have been obvious to the skilled artisan at the time of the invention to apply the known method of Abe of optimizing the relative amounts of the base particle and the coating material in a coated active material to the particles of Yamaura and the results would have been predictable.

Second, the examiner notes that it appears that Appellant has inadvertently conflated the amounts of olivine compound and lithium nickelate taught in the method of Yamaura. At paragraph [0054] of Yamaura, it is taught that 30.0 g of lithium nickelate particles are coated with 1.0 g of $LiFePO_4$. This is 3.3 wt%, which is arguably about 5 wt%. Still, the examiner has combined the teachings of Yamaura with those of Abe in order to show that it would have been obvious to the skilled artisan to optimize the relative amounts of the two materials. Appellant has not provided any teaching or showing that the claimed weight percent range provides unexpected results.

In summary, the examiner finds that, contrary to Appellant's arguments, Yamaura does teach a uniform coating of $LiFePO_4$ on lithium nickelate particles. Additionally, the examiner is not convinced by Appellant's arguments that the combination of Yamaura in view of Abe would not lead one of ordinary skill in the art to combine the lithium nickelate and $LiFePO_4$ coating in an amount within the claimed range.

(11) Related Proceeding(s) Appendix

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

/Alix Echelmeyer/

Conferees:

/ULA C. RUDDOCK/

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/David A. Simmons/

Quality Assurance Specialist, Tech Center 1700